Amendments To the Claims

Claim 1 (Original): A viral immunogen derived from a mammalian virus and expressed in a plant.

Claim 2 (Original): The immunogen of claim 1 wherein at least a portion of said plant is edible.

Claim 3 (Original): The immunogen of claim 1 wherein said immunogen is mucosal immunogen.

Claim 4 (Original): The immunogen of claim 3 wherein the mucosal immunogen is capable of binding a glycosylated molecule on the surface of a membrane of a mucosal cell.

Claim 5 (Original): The immunogen of claim 1 wherein said immunogen is a chimeric protein.

Claim 6 (Original): The immunogen of claim 1 wherein said immunogen is an immunogen derived from a hepatitis virus.

Claim 7 (Original): A viral mucosal immunogen derived from a hepatitis virus, wherein said immunogen is expressed in a plant, wherein said immunogen is capable of binding a glycosylated molecule on a surface of a membrane of a mucosal cell.

Claim 8 (Original): A transgenic plant comprising a plant expressing a recombinant viral immunogen derived from a mammalian virus.

Claim 9 (Original): The transgenic plant of claim 8 wherein said plant is edible.

Claim 10 (Original): The transgenic plant of claim 8 wherein said immunogen is a mucosal immunogen.

Claim 11 (Original): The transgenic plant of claim 8 wherein the mucosal immunogen is capable of binding a glycosylated molecule on the surface of a membrane of a mucosal cell.

Claim 12 (Original): The transgenic plant of claim 8 wherein said immunogen is a chimeric protein.

Claim 13 (Original): The transgenic plant of claim 8 wherein said immunogen is an immunogen derived from a hepatitis virus.

Claim 14 (Original): A transgenic plant expressing a recombinant viral mucosal immunogen of hepatitis virus, wherein said mucosal immunogen is capable of binding a glycosylated molecule on a surface of a membrane of a mucosal cell.

Claim 15 (Original): A vaccine comprising a recombinant viral immunogen expressed in a plant.

Claim 16 (Original): The vaccine of claim 15 wherein said immunogen is a mucosal immunogen.

Claim 17 (Original): The vaccine of claim 15 wherein the mucosal immunogen is capable of binding a glycosylated molecule on the surface of a membrane of a mucosal cell.

Claim 18 (Original): The vaccine of claim 14 wherein said immunogen is a chimeric protein.

Claim 19 (Original): The vaccine of claim 14 wherein said immunogen is an immunogen derived from a hepatitis virus.

Claim 20 (Original): A vaccine comprising a mucosal immunogen of hepatitis virus expressed in a plant, wherein said mucosal immunogen is capable of binding a glycosylated molecule on a surface of a membrane of a mucosal cell.

Claim 21 (Original): A food comprising at least a portion of a transgenic plant capable of being ingested for its nutritional value, said plant comprising a plant expressing a recombinant viral immunogen.

Claim 22 (Original): The food of claim 21 wherein said immunogen is a mucosal immunogen.

Claim 23 (Original): The food of claim 21 wherein the mucosal immunogen is capable of binding a glycosylated molecule on the surface of a membrane of a mucosal cell.

Claim 24 (Original): The food of claim 21 wherein said immunogen is a chimeric protein.

Claim 25 (Original): The food of claim 21 wherein said immunogen is an immunogen derived from a hepatitis virus.

Claim 26 (Original): A food comprising at least a portion of a transgenic plant capable of being ingested for its nutritional value, said plant expressing a recombinant viral mucosal immunogen of hepatitis virus, wherein said mucosal immunogen is capable of binding a glycosylated molecule on a surface of a membrane of a mucosal cell.

Claim 27 (Original): The food of any of claims 21-26 wherein said plant portion includes the fruit, leaves, stems, roots, or seeds of said plant.

Claim 28 (Original): A plasmid vector for transforming a plant comprising:

a DNA sequence encoding a viral immunogen; and

a plant-functional promoter operably linked to said DNA sequence capable of directing the expression of said immunogen in said plant.

Claim 29 (Original): The plasmid vector of claim 28 further comprising a selectable or scorable marker gene.

Claim 30 (Original): The plasmid vector of claim 28 wherein said plant promoter comprises CaMV35S.

Claim 31 (Original): The plasmid vector of claim 28 wherein said plant is edible.

Claim 32 (Original): The plasmid vector of claim 28 wherein said immunogen is a mucosal immunogen.

Claim 33 (Original): The plasmid vector of claim 28 wherein the mucosal immunogen is capable of binding a glycosylated molecule on the surface of a membrane of a mucosal cell.

Claim 34 (Original): The plasmid vector of claim 28 wherein said immunogen is a chimeric protein.

Claim 35 (Original): The plasmid vector of claim 28 wherein said immunogen is an immunogen derived from a hepatitis virus.

Claim 36 (Original): A plasmid vector for transforming a plant comprising:

a DNA sequence encoding a mucosal immunogen of hepatitis virus, said mucosal immunogen capable of binding a glycosylated molecule on a surface of a membrane of a mucosal cell; and

a plant-functional promoter operably linked to said DNA sequence capable of directing the expression of said immunogen in said plant.

Claim 37 (Original): A DNA fragment useful for microparticle bombardment transforming a plant comprising:

a DNA sequence encoding a viral immunogen; and

a plant-functional promoter operably linked to said DNA sequence capable of directing the expression of said immunogen in said plant.

Claim 38 (Original): The DNA fragment of claim 37 further comprising a selectable or scorable marker gene.

Claim 39 (Original): The DNA fragment of claim 37 wherein said plant promoter comprises CaMV35S.

Claim 40 (Original): The DNA fragment of claim 37 wherein said plant is edible.

Claim 41 (Original): The DNA fragment of claim 37 wherein said immunogen is a mucosal immunogen.

Claim 42 (Original): The DNA fragment of claim 37 wherein the mucosal immunogen is capable of binding a glycosylated molecule on the surface of a membrane of a mucosal cell.

Claim 43 (Original): The DNA fragment of claim 37 wherein said immunogen is a chimeric protein.

Claim 44 (Original): The DNA fragment of claim 37 wherein said immunogen is an immunogen derived from a hepatitis virus.

Claim 45 (Original): A DNA fragment for ballistically transforming a plant comprising:

a DNA sequence encoding a mucosal immunogen of hepatitis virus, said mucosal immunogen capable of binding a glycosylated molecule on a surface of a membrane of a mucosal cell; and

a plant-functional promoter operably linked to said DNA sequence capable of directing the expression of said immunogen in said plant.

Claim 46 (Original): A method for constructing a transgenic plant cell comprising the steps of:

constructing a plasmid vector or a DNA fragment by operably linking a DNA sequence encoding a viral immunogen to a plant-functional promoter capable of directing the expression of said immunogen in said plant; and

transforming a plant cell with said plasmid vector or DNA fragment.

Claim 47 (Original): The method of claim 46 further comprising the step of;

regenerating a transgenic plant from said transgenic plant cell.

Claim 48 (Original): A method for producing a vaccine comprising the steps of:

constructing a plasmid vector or a DNA fragment by operably linking a DNA sequence encoding a viral immunogen to a plant-functional promoter capable of directing the expression of said immunogen in said plant;

transforming a plant cell with said plasmid vector or DNA fragment; and

recovering said immunogen expressed in said plant cell for use as a vaccine.

Claim 49 (Original): The method of claim 48 further comprising the step of;

prior to recovering said immunogen for use as a vaccine, regenerating a transgenic plant from said transgenic plant cell.

Claim 50 (Original): The method of claim 48 wherein said recovery step further comprises obtaining an extract of said plant cell.

Claim 51 (Original): The method of claim 49 wherein said recovery step further comprises harvesting at least a portion of said transgenic plant.

Claim 52 (Original): The method of claim 48 wherein said plant cell is transformed utilizing an Agrobacterium system.

Claim 53 (Original): The method of claim 52 wherein said Agrobacterium system is an Agrbacterium tumefaciens-Ti plasmid system.

Claim 54 (Original): The method of claim 48 wherein said plant cell is transformed utilizing a microparticle bombardment transformation system.

Claim 55 (Original): The method of claim 48 wherein said DNA sequence is a DNA sequence encoding a hepatitis virus immunogen.

Claim 56 (Original): The method of claim 48 wherein said plant is a tomato plant.

Claim 57 (Original): The method of claim 48 wherein said plant is a tobacco plant.

Claim 58 (Original): The method of claim 48 wherein said plasmid vector is a binary vector.

Claim 59 (Original): The method of claim 48 wherein said plasmid vector is an integrative vector.

Claim 60 (Original): The method of claim 48 wherein said plasmid vector is pB121.

Claim 61 (Original): The method of claim 48 wherein said plant cell is transformed by microinjection.

Claim 62 (Original): The method of claim 48 wherein said plant cell is transformed by polyethylene glycol mediated uptake.

Claim 63 (Original): The method of claim 48 wherein said plant cell is transformed by electroporation.

Claim 64 (Original): The method of claim 48 wherein said plant cell is transformed by microparticle bombardment.

Claim 65 (Original): The method of claim 48 wherein said plant cell is a cell of dicotyledon.

Claim 66 (Original): The method of claim 48 wherein said plant cell is a cell of a monocotyledon.

Claim 67 (Original): A method of administering any of the vaccines of claims 15-20 comprising administering a therapeutic amount of said vaccine to a mammal.

Claim 68 (Original): The method of claim 67 wherein the administering of a vaccine further comprises a parenteral introduction of said vaccine into said mammal.

Claim 69 (Original): The method of claim 67 wherein the administering of a vaccine further comprises a non-parenteral introduction of said vaccine into said mammal.

Claim 70 (Original): The method of claim 69 wherein said non-parenteral introduction of said vaccine into said mammal further comprises an oral introduction of said vaccine into said mammal.

Claim 71 (Original): A method of administering an edible portion of a transgenic plant, which transgenic plant expresses a recombinant viral immunogen, to a mammal as an oral vaccine against a virus from which said immunogen is derived, comprising:

harvesting at least an edible portion of said transgenic plant; and

feeding said harvested portion of said transgenic plant to a mammal in a suitable amount to be therapeutically effective as an oral vaccine in the mammal.

Claim 72 (Original): A method of producing and administering an oral vaccine, comprising the steps of:

constructing a plasmid vector or DNA fragment by operably linking a DNA sequence encoding a viral immunogen to a plant-functional promoter capable of directing the expression of said immunogen in a plant;

transferring the plasmid vector into a plant cell;

regenerating a transgenic plant from said cells;

harvesting an edible portion of said regenerated transgenic plants; and

feeding said edible portion of said plant to a mammal in a suitable amount to be therapeutically effective as an oral vaccine.

Claim ~~101~~ 73 (Currently amended): A vector for transforming a plant comprising:

a DNA sequence encoding a recombinant viral antigen protein, said protein being antigenic to an animal; and

a plant functional promoter operably linked to said DNA sequence which directs expression of said protein in said plant.

Claim ~~102~~ 74 (Currently amended): The vector of claim ~~101~~ 73 wherein said vector is a plasmid vector.

Claim ~~103~~ 75 (Currently amended): The vector of claim ~~101~~ 73 wherein said vector is a viral vector.

Claim ~~104~~ 76 (Currently amended): The vector of claim ~~101~~ 73 wherein said antigen protein is from TGEV.

Claim ~~105~~ 77 (Currently amended): A plasmid vector for transforming a plant comprising:

A DNA sequence encoding a recombinant viral antigen protein, said protein being antigenic to a human or an animal; and

a plant-functional promoter operably linked to said DNA sequence which directs the expression of said protein in said plant.

Claim ~~106~~ 78 (Currently amended): The vector of claim ~~101~~ 73 wherein said expression is preferentially directed to the seed of said plant.

Claim ~~107~~ 79 (Currently amended): The vector of claim ~~101~~ 73 wherein said vector is capable of achieving expression levels of 0.1% total soluble protein.

Claim ~~108~~ 80 (Currently amended): The vector of claim ~~101~~ 73 wherein said vector is capable of achieving expression levels of 0.05% total soluble protein.

Claim ~~109~~ 81 (Currently amended): The vector of claim ~~101~~ 73 wherein said vector is capable of achieving expression levels of 0.03% total soluble protein.

Claim ~~110~~ 82 (Currently amended): The plasmid vector of claim ~~101~~ 73 wherein said protein is chimeric by being fused to another peptide, polypeptide or protein such that expression of the protein is enhanced over levels of expression in absence of said fusion.

Claim ~~111~~ 83 (Currently amended): The plasmid vector of claim ~~101~~ 73 further comprising a translational enhancing sequence.

Claim ~~112~~ 84 (Previously presented): The plasmid vector of claim ~~101~~ 73 wherein the DNA encoding the viral antigen protein is truncated from the native wild type DNA sequence encoding said protein.

Claim ~~113~~ 85 (Currently amended): The plasmid vector of claim ~~101~~ 73 wherein the promoter preferentially expresses the viral antigen protein in an edible portion of the plant.

Claim ~~114~~ 86 (Currently amended): The vector of claim ~~101~~ 73 wherein said viral antigen protein is from TGEV.

Claim ~~115~~ 87 (Currently amended): The vector of claim ~~101~~ 73 wherein said vector directs expression to the seed of said plant.